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Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

No. 181

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BRIEFS

UAE, PAKISTANI ACENCIES SIGN ACREEMENT--Abu Dhabi, 26 Aug (GNA)--A news cooperation and exchange agreement was signed here today between the Emirates News Agency and the Pakistani News Agency [not further specified]. The agreement provides for expanding bilateral news coverage, exchangiug international news that concerns the two countries and increasing the volume of news on each country broadcast by the two agencies. The agreement also provides for a mutual free exchange of news. It is part of a joint media and cultural cooperation scheme between the two countries. [Text] [GF261456 Manama Gulf News Agency in Arabic 1206 GMT 26 Aug 81]

CSO: 5500/2295

BRIEFS

TV EQUITY IN SATELLITE--Canberra--The Federal Government is preparing to limit the influence of television networks on the operations of the domestic communications satellite. The Government is considering putting a ceiling on the amount of shares that any company may hold in the satellite. In a speech to the National Country Party conference in Adelaide at the weekend, the Minister for Communications, Mr Sinclair, indicated support for limiting the shareholdings. It is likely the limits would be similar to those on shareholdings in Australia's private banks. Under the Banking Act, no shareholder or groups of associated companies may hold more than 10 per cent of the shares in a bank. The Government has already said the satellite will be owned 49 per cent by the private sector. The remaining 51 per cent equity will be held by the Government possibly through a new statutory authority. The Department of Communications is examining possible ownership arrangements for that part of the satellite which will be owned by the private sector. In addition to support for splitting the private ownership of the satellite into small parcels, Mr Sinclair also gave support for restrictions on ownership of the satellite by its major users. This would involve restrictions on ownership by the main television networks and the communications industry. [Text] [Melbourne THE AGE in English 3 Aug 81 p 5]

CSO: 5500/7545

ISRO HEAD TELLS SATELLITE LAUNCHING PLANS

New Delhi PATRIOT in English 30 Jul 81 p 7

[Text]

BOMBAY, July 29 (UNI) —The Indian Space Research Organisation (ISRO) is planning to launch satellites like Bhaskara and Payloads, weighing between 600 and 700 kg into sun-synchronous orbits by 1985-86, according to ISRO satellite centre director UR Rao.

The ISRO was also planning to upgrade SLV-3 launch vehicle with strap-on boosters to achieve a capability of launching 150-kg payloads and develop a totally new vehicle in two to three years, Prof Rao told UNI.

He said with the know-how gained from the Indian national satellites and later with the development of our own launch vehicle SLV-3, the country would be able to launch its own communication satellites in a few years.

Prof Rao said it was essential to launch sounding rockets for carrying out experiments related to atmospheric physics, meteorology and astronomy. These were basically designed to understand the atmosphere, atmospheric circulation and the ionosphere.

He said the equatorial electrojet passes the country right over the geomagnetic Equator below which Thumba was located and since then we have made considerable progress. Within a short time, it was quite clear that the space technology could provide benefits, particularly in the areas of remote sensing, meteorology, communications and other resources.

In his opinion, a developing country like India can avoid step-by-step progress followed by developed countries. 'By avoiding the intermediate steps we can reach the level of progress the others have already reached.'

Prof Rao said one must base one's choice on sound technological judgments and cost benefits so that the sophisticated technology was adopted not for prestige but to cater to the needs of the country.

India, therefore, preferred the satellite technology in 1972 since the purpose of any peaceful space programme was to launch satellites, particularly for application purposes. Thus Aryabhata, the first satellite, was launched in 1975 with Soviet Assistance to build the capability in spacecraft technology in its thermal controls, telecommands, data transmission and power system.

Having proven that capability we immediately went to Bhaskara, an experimental earth resources satellite, to provide imagery over the country and the surrounding areas for aiding hydrology, forestry, snow-cover, snow-melt and ocean surface conditions, he said.

Prof Rao said Bhaskara-II was to be launched within the next few months and, ... likewise, we took up work on highly complicated Ariane Passenger Payload-Experiment (APPLE) which was a three-axis stabilised geostationary satellite. This would pave the way for future operational communication satellites as Bhaskara was paving way for the future earth resources satellite.

The ISRO director said Bhaskara was providing us pictures from both its television cameras and microwave imagery, of the Indian sub-continent and the surrounding oceans for resources purposes and, in the meantime, "we also went through the satellite instructional television experiment (SITE) where we had borrowed the ATS-6 satellite for a year from NASA and used it for demonstrating the capability of a communications satellite".

It was used for the purpose of education in remote rural areas which demonstrated that a communications satellite of this type was the answer to the problem of improvement of quality of life in the rural areas in our own lifetime, he said.

Meanwhile, encouraged by the success of Bhaskara, "we have already started working on the design of a semi-operational remote sensing satellite with a resolution of 40 to 50 metres, unlike Bhaskara which had a resolution of only 800 metres" Prof Rao said.

This satellite, which would be called the Indian remote sensing (IRS) satellite, would hopefully provide information in areas like agriculture and soil mechanics, geology and mining, which was crucial for the development of the country.

CSO: 5500/7168

SATELLITE DEVELOPMENTS IMPROVE WEATHER FORECASTING

Bombay THE TIMES OF INDIA in English 1 Aug 81 p 6

[Text]

SECUNDERABAD, July 31: The National Remote Sensing Agency (NRSA) here, which is under the department of space of the government of India, successfully predicted this year also the snowmelt inflow into the Bhakra reservoir from Satlej river catchment using satellite data recorded at NRSA earth station at Shadnagar near Hyderabad. They also predicted successfully for the first time the snowmelt flow of the Ganga river.

With the advent of satellite remote sensing, it has now become possible to map and monitor reasonably accurately vast areas of snow-cover in the Himalayas and forecast snowmelt runoff.

The NRSA made an indepth study of the AVHRR (Advanced Very High Resolution Radiometer) meteorological daily data of U.S. NOAA (National Oceanic and Atmospheric Administration) satellite for January-March and predicted the snowmelt runoff using regression model developed by NRSA.

The Bhakra-Beas management board, the Central water commission and the Central electricity authority were informed by NRSA in the first week of April that the total snowmelt inflow into Bhakra would be about 1.7 million cusec-days. Against that, the measured inflow was 1.619 million cusec-days—a discrepancy of only five per cent.

The forecast given by NRSA last year differed from the actual by about ten per cent.

A similar study was done for the first time in the case of the Ganga river this year. The snow-melt runoff of the Ganga at Devaprayag predicted by NRSA in the first week of April has been only six per cent more than the actual runoff.

Such forecasts help the authorities concerned to regulate and make the optimism use of the valuable scarce summer flows for power generation, irrigation, drinking water-supply, etc.

With the experience gained during the last couple of years and with the data available from NOAA and Landsat satellites and from the Indian satellites like the SEO-II which is to be launched soon, forecasting of the snowmelt runoff will be done with greater confidence in the coming years.

CSO: 5500/7169

WORLD BANK AID FOR TELELINKS TOTALS $802 MILLION

Calcutta THE STATESMAN in English 9 Aug 81 p 7

[Text] NEW DELHI, Aug. 8.—With the recently negotiated credit of $314 million from the World Bank, the total assistance from the bank and its affiliates for telecommunications in India adds up to $802 million.

The latest credit negotiated with the International Development Association, a World Bank affiliate, is free of interest, with a service charge of up to 1% a year on the principal. The principal is to be repaid in 50 years, with an initial grace period of 10 years, in semi-annual instalments from about the middle of 1991.

The beneficiaries will be the Indian Telephone Industries, the Hindustan Cables, the Hindustan Teleprinters and the Posts and Telegraphs Department.

Out of the total assistance of $802 million, $444 million have been allocated for procurement of raw materials and components for the Indian Telephone Industries, Hindustan Cables and Hindustan Teleprinters.

A special feature of the latest credit from the International Development Association is that for the first time it is financing the setting up of new manufacturing units in the telecommunications sector.

Out of the $314 million, $44.8 million have been allocated to set up three manufacturing units—the Palghat factory under the ITI to manufacture 150,000 lines of electronic switching equipment costing $12.8 million in foreign exchange, a new cable factory at Hyderabad to manufacture 3 million conductor km of underground telephone cables at a cost of $25 million and a new electronic teleprinter factory at Hosur to manufacture 8,000 units of electronic teleprinter machines costing $6.5 million.

Of the posts and telegraphs project, the largest share of $94.5 million goes to ITI, followed by $77.2 million to HCL and $1.3 million for HTL.

CSO: 5500/7174a

WRITER EXAMINES CAPABILITIES OF 'APPLE' SATELLITE

Bombay THE TIMES OF INDIA in English 2 Aug 81 Supplement p 4

[Article by N. L. Chowla: "Going Places With the APPLE"]

[Text] The APPLE satellite is capable of providing a television and radio network for different parts of the country. For a country of India's size and heritage, interpersonal communication satellites can revolutionise the thinking and action processes.

THE spacecraft APPLE (Araine Passenger Payload Experiment) has already entered the operational phase for several kinds of experiments in communication. The satellite has been linked with the earth stations at Delhi and Madras and with the transportable remote area communication terminal (TRACT) at Ahmedabad. These linkages have been tested and found satisfactory. The Ahmedabad Tract has also demonstrated its linkage with Bangalore by transmitting a TV programme through the satellite. The C band communication transponder, which is the nerve centre of the APPLE, is receiving telecommunication and TV signals to amplify and retransmit them over the entire country even to remote areas. Its 90 cm. dish antenna which is pointed towards the beam centre at Nagpur is in a position to enable "APPLE's voice" cover the entire country. The transponder is operating in the 6/4 GHz bands. In fact APPLE's transmission frequency is such that there can also be a spillover to neighbouring countries of Pakistan, Bangladesh, Sri Lanka and Burma. It is a matter of no small recognition of our technological capability that the payload integration of the C band transponder as well as the Apogee Boost Motor which fired the APPLE into a geostationary orbit were developed in India, the former at the Space Application Centre at Ahmedabad and the latter at the Vikram Sarabhai Space Centre, Trivandrum.

Thus India's first synchronous communication satellite which should be in use for about a year is ready for wide-ranging experiments in the uses of satellite for communication purposes. The experiments which can be conducted are varied and include nationwide radio and television networking, point-to-point communication, data transfer, interconnecting of computers and Time Division Multiple Access which will determine the future of satellite linked telephone systems and will enable a number of messages to be transmitted on a single frequency. Under Spread Spectrum Multiple Access the experiments will investigate the feasibility of using spread spectrum pseudo-noise coding techniques as a means of providing random multiple access communication through a satellite. These experiments will lead to a more efficient use of satellite repeater power and bandwidth. Other experiments through the APPLE are expected to generate criteria for the designing of future operational packet switched data transmission systems and testing the interface equipment. They will help develop a small, portable terminal for satellite communication by the use of various advanced techniques. The Post and Telegraph department has planned to develop indigenous capability of designing and fabrication of hardware which will open up possibilities of introducing new techniques and services.

It has been claimed that the capability of this scale has hitherto been demonstrated only by the USA, USSR, France and Canada. All that and more heralds a major breakthrough. But even though the APPLE is essentially a technological satellite planned to gain experience in some of the sophisticated operabilities of a geostationary satellite and its control and management, the relevance of the APPLE to demonstrate experimentation in communication involving people should not be lost sight of. For example, the APPLE is capable of providing television and radio network for different parts of the country. It can also bring together in one network computers and teleprinters anywhere in the country and this in turn can bring about closer cooperation among institutions engaged in scientific and communication activities. The linkages can also be used by railway authorities to monitor the booking of reservations in the entire network of the railways and by the telegraph services to transmit telegrams through the satellite. But we should be interested in what has

been planned to be achieved during the year.

An interesting proposal that has so far emerged for utilising the APPLE network is for conducting a summer school, through satellite communication, at the Indian Institute of Technology at Kharagpur. The Space Application Centre has proposed to locate a TRACT at IIT Kharagpur and through it will be established a television network between the IITs at Delhi, Madras and Kharagpur and the Space Application Centre at Ahmedabad. Delhi and Madras have earth stations and SAC in Ahmedabad is equipped with TRACT. The IITs at Bombay and Kanpur, and other educational institutions are also expected to join the experiment. What has been proposed is the use of the network for conducting a post-graduate level satellite communication course, common for all IIT students. The faculty for this course could come from any or all the IIT centres. Under the experiment, television lectures for about one hour duration will be prepared in advance and transmitted. At the end of each lecture the faculty member concerned would be available for sitting at different centres. A two-answering questions from students way teaching system, connecting several places, although not quite an innovation, will be tried in our country for the first time. The students will have the thrilling experience of interacting with an eminent teacher without having him in the classroom. Such a television course on a highly technical subject like satellite communication enlisting the participation of the best academic talent from different IITs and other technical organisations would indeed be the beginning of a new era in education.

Similarly a TRACT is also intended to be located in north-east India connecting a micro-level project with the rest of the country to test communication links through satellite with that region. According to ISRO sources, TV coverage of the Independence Day function at the Red Fort including the Prime Minister's speech will be relayed via the APPLE. But is that all that can be experimented with?

In May 1979 the Space Application Centre put out an announcement of an opportunity for the conduct of experiments using the APPLE spacecraft. The announcement gave details of possible experiments and indicated the potentialities as well as the constraints of the APPLE. Some of the possible uses listed were to use the APPLE for the training of trainers in villages — through conducting multi-location seminars — to study the social, economic and cultural impact of the introduction of telecommunication facilities of a new dimension in "virgin" areas, to study the impact on decision-making and administration caused by the provision of reliable, high quality, instantaneous point-to-point communication and to plan and try out experiments in participative "face-to-face" democracy. Clearly, the two-way audio or even video linking remote locations to state capitals and/or the national capital opens up numerous possibilities for direct communication with the people in the rural areas. It needs to be appreciated that for a country of India's size and heritage of interpersonal communication satellite linkages can revolutionise the thinking and action processes.

When the Indian Space Research Organisation invited proposals for experimentation with any one of these ideas the response was poor. The 'software' organisation which could sponsor experiments in social or educational communication hardly showed any interest. Only some response for the testing of hardware was forthcoming.

It has been stated that in an experiment under "participative democracy" there is the possibility of setting up a two-way live TV link between one of the earth stations like Delhi and any place in the country by deploying a truck-mounted terminal via the APPLE. Presumably it is possible to use the link for a dialogue between the Prime Minister in Delhi and villagers in a distant location. The Prime Minister could thus be brought 'face-to-face' with the people in remote areas. In our situation such an experiment would generate a unique interest. What the SITE could not provide but the APPLE can is a two-way face-to-face communication. Can we not try this experiment and test the technological capability as well the programme format? What can be a more demonstrative way of making ordinary people aware of our advance in technology? It would be interesting to ascertain why several organisations including AIR and Doordarshan have not responded to ISRO's effort to use the potential of the APPLE. Why haven't we set up training centres, as earlier envisaged, at places where training programmes for teachers or village health workers could be conducted through the APPLE? It has also been claimed that the APPLE can be used for an experiment in "tele-medicine". A doctor can examine via satellite patients located at remote places. Paramedical staff can operate a television camera and put out a relay through the satellite channel. The doctor would visually examine the patient. He could ask questions, listen to the patient's heart-beat and see his blood pressure. To argue that such an experiment "may not be worthwhile in the Indian context because the emphasis should be on 'preventive rather than curative aspects'" is not good enough if the messages of our technological achievements are to be taken to the people. Why haven't we planned for the use of the APPLE for sharing medical education? If it is possible for a surgical operation in one of the prestigious medical institutions to be seen by medical students in other parts of the country who would later ask questions from the surgeon what has prevented the institutions to plan such an experiment?

There is a clear case for using the APPLE to excite popular imagination.

Telecommunications are vital to our progress and television is primarily committed to be used for information and education. It can also not be missed that the APPLE mission is in preparation for the launching of the first Indian National Satellite (INSAT) next year. Let us conduct some of these very worthwhile experiments in software communication. The experiments should not be aimed at acquiring the requisite technology for application in INSAT only.

CSO: 5500/7170

'APPLE' USED IN NATIONWIDE TELEVISION BROADCAST

New Delhi PATRIOT in English 14 Aug 81 pp 1, 5

[Text] INDIA took a great leap forward in satellite communications on Friday when Prime Minister Indira Gandhi launched APPLE into its utilisation phase in a 20-minute programme telecast nationwide, report agencies.

Television viewers all over the country simultaneously saw the Prime Minister inaugurate the APPLE satellite utilisation experiment from the Delhi Earth Station.

The inauguration, in fact, was split between the Delhi earth station and the Vikram Hall of the Space Application Centre at Ahmedabad where the scientists associated with APPLE from its conception to launch had assembled.

In what was the first tele-conference with the help of APPLE, the scientists were brought face to face with Mrs Gandhi, who handed over a model of APPLE to Communication Minister C M Stephen at the Delhi Earth Station in Budha Jayanti Park.

Via APPLE, the 20-minute ceremony was witnessed live in Delhi, Bombay, Calcutta, Madras, Pune and Ahmedabad.

The transmission came through with flying colours the picture as sharp as on a normal telecast and the sound crystal clear.

'That you can see and hear me,' Mrs Gandhi said to viewers across the nation 'is a symbol of our growing technological self reliance. It is a symbol of the use of science for peaceful and experimental purposes.'

ACHIEVEMENT

She described the ceremony as a 'small function for a big achievement' and utilised it to greet the scientists and engineers of India and in particular our children, who are the scientists of tomorrow.

She conveyed her special congratulations 'to the scientists of the Indian Space Research Organisation, who through APPLE, 'have earned the respect of the world.'

Prior to the inauguration ceremony, APPLE relayed from Ahmedabad the story of its life, from its inception, through its launch from Kourou in French Guyana two months ago and the problems that occurred prior to its parking in space.

Interspersed with this were interviews with the scientists and technicians involved in the project.

Bangalore Satellite Centre director Prof U. R. Rao said in an interview that the space scientists will renew their efforts to unfurl the second solar panel of APPLE, once all scheduled experiments are gone through.

CSO: 5500/7181

PLANS FOR TELEVISION REPLAY CENTERS REPORTED

New Delhi PATRIOT in English 4 Aug 81 p 5

[Text]

A relay television centre may be established at Bangalore to enable the people in the city to view programmes put out by both Madras and Bombay TV centres before a regular centre is established there reports UNI.

Information and Broadcasting Ministry sources said on Monday the micro-wave link between Madras and Bombay passes through Bangalore and would make the setting up of the relay centre feasible.

Bangalore is one of the three centres where regular TV centres are to be established during the sixth Plan. The other two centres are Ahmedabad and Trivandrum.

The proposal to set up a TV centre in Gauhati included in the revised plan has still to be cleared by the Public Investment Board. The total cost of setting up TV centres at Ahmedabad, Bangalore and Trivandurm is estimated at Rs 13.08 crores.

The site for the Ahmedabad TV centre has already been acquired near Thaltej.

The sources said that construction of the building had been handed over to the State Government and the State PWD department was drawing up a detailed plan for the same. Orders for equipment and the transmitter for the centre had already been placed with the public sector undertaking, Bharat Electronics Limited. The centre is estimated to cost Rs 4.69 crores when it is ready in 1984.

The Bangalore TV centre will be located on the Jayamahal Road where an appropriate site had acquired and the foundation stone laid by the Minister of Information and Broadcasting Vasant Sathe. Estimated to cost Rs 3.91 crores, building construction has been entrusted to the Karnataka Government.

The Trivandrum TV centre will cost Rs 4.48 crores. Land for this centre has been acquired and the foundation stone for the building laid by Mr Sathe. Orders for equipment and transmitter for this centre have also been placed with BEL.

The Government proposes also to set up eight relay centres at the following places: Panaji (GOA) Asansol (West Bengal), Madural (Tamilnadu), Murshidabad (West Bengal Varanasi (UP) Vijayawada Andhra) Cuttack (Orissa) and Kasavli (Himachal Pradesh).

CSO: 5500/7172

REGULATION OF TWO-WAY RADIO COMMUNICATIONS EASED

Bombay THE TIMES OF INDIA in English 3 Aug 81 p 20

[Text]

NEW DELHI August 2 (PTI): Like in many Western countries, the two-way communication by radio will become a common place in India in the next few years.

The ministry of communications has decided to liberalise the issue of licences for fixed and mobile radios to the public sector and government agencies that have a genuine need for two-way communications.

It will however be a while before taxis and private cars would be permitted to install radio telephones or individuals would be allowed walkie-talkies.

Official sources said that several aspects, including national security, would have to be taken into account before putting the two-way radio equipment in private hands.

SEVERAL INQUIRIES

Meanwhile, the Karnataka state transport corporation has been given licence for two-way radio for keeping contact with its fleet of buses.

The ministry has been flooded with inquiries from several state and Central government agencies for two-way radio communication licences, the sources said.

In the capital, the Delhi transport corporation, mother dairy, the Delhi electric supply undertaking, fire and ambulance services are planning for two-way radio communications.

Transport corporations in Punjab and Haryana and the Bombay electric supply and transport (BEST) were keen on using the facility, the officials said.

The communications ministry is the custodian of radio frequency and is responsible for the allocation of frequencies to various users.

The officials said the frequency bands reserved for the two-way radio traffic were at present under-utilised unlike in Western countries where the spectrum is saturated.

They said the use of the radio spectrum for meeting communications needs of government and public sector agencies would speed up the development process.

There was always the possibility that the two-way radios would be misused and hence the ministry would go slow in extending this facility to private agencies, the officials said.

The two-way radio equipment would be fixed as well as mobile. A high-power fixed equipment could cover a radius of 40 km., they said.

CSO: 5500/7171

INDIA RADIO TERMINATING PRESS AGENCY CONTRACTS

Calcutta THE STATESMAN in English 12 Aug 81 p 9

[Text] NEW DELHI, Aug. 11.—The Union Government recently issued notices to four news agencies terminating the agreement between them and AIR and Doordarshan on the "supply" of news to these two organizations. The news agencies are: Press Trust of India, United News of India, Hindustan Samachar and Samachar Bharati.

Information and Broadcasting Ministry sources said the notices had been issued to restructure the AIR-Doordarshan subscription formula necessitated by the abolition of licence fee for one band and two-band small radio sets in the 1980-81 Budget. The subscription payable to news agencies by AIR and Doordarshan is based on the number of radio licences.

The notices have been issued under clause 6 of the agreement between the news agencies and the Government which reads: "This agreement shall be deemed to have been in force from .. and shall continue till terminated by either party on six months' notice given in writing". The agreements were signed in March, 1979, after the split of Samachar.

But it is not clear why the notices were not issued under clause 2(8) which inter alia said: "The above rates of subscription will take effect from 9-3-78 and will continue to be in force till terminated by either side on six months notice, given in writing ....."

The present subscription formula does not satisfy the news agencies in view of the abolition of licence fee in respect of one and two-band radio sets which naturally brought down their share.

The financial implication of the Pa'ekar award forced them to seek revision of the subscription formula. The payment by AIR and Doordarshan is the mainstay of the economy of the news agencies. For example, in 1979-80 PTI received from AIR and Doordarshan Rs 34.32 lakhs, UNI Rs 22.53 lakhs, Samachar Bharati Rs 4.60 lakhs and Hindusthan Samachar Rs 5.25 lakhs.

The news agencies have been asked to furnish relevant facts to enable the Government to revise the subscription formula.

CSO: 5500/7176

INDIAN TELEPHONE INDUSTRIES EXPANSION PLANNED

Bombay THE TIMES OF INDIA in English 8 Aug 81 p 9

[Article by S. Dharmarajan]

[Text] Parked in the premises of the complex of Indian Telephone Industries (ITI) here is a blue and silver truck trailer with an antenna attached to its rear.

Inside the vehicle standing amidst a maze of equipment, a young engineer proudly points to electronic beams recorded on a screen representing the signals relayed and received from APPLE, positioned 36,000 km up in space.

A few yards away in a hall, a group of technicians are making final checks of a row of telephone lines of a system which the ITI started manufacturing soon after it was established 30 years ago and proposes to phase out in a couple of years.

The progress of the ITI from the manufacture of the particular telephone system to the mobile earth station at the end of the assembly line epitomises the ITI's effort to accept and absorb the latest technology and constantly update it to keep abreast of the advances in the world.

These also point to the problems the major public undertaking faces in its efforts to keep pace with the global telecommunications revolution.

R & D Efforts

The mobile earth station, fully designed and fabricated to a large extent in the ITI, is part of the wide spectrum of equipment which have resulted from an intensive R and D effort. At the same time, the rapid rate of obsolescence of this technology poses a constant challenge to its engineers. Still, the ITI could be justifiably proud of its R and D as its performance shows.

The ITI spends five to six per cent of its turnover of Rs. 104 crores on R and D. While this compares well with the effort in many public and private undertakings, the amount is too small for a wide area like electronics and telecommunications, where technology advances at a breathtaking pace.

The rapid strides in technology have brought to the ITI the problem of redundancies. The factory is faced with the task of redeploying and training as many as 4,000 to 5,000 employees in new areas, as it stops producing in the next three years the system of telephone lines with which it began operations in 1948.

A separate centre is being started by the ITI to train these employees in the manufacture of electronic switching equipment, for the programme for the next several years is designed to go electronic from the current electro-mechanical system.

Shortfall Expected

The ITI, which has in over three decades grown in proportion far beyond what was envisaged at its start, has nine units located in five centres. It will have yet another factory as part of expansion schemes to meet the demands for exchanges in the 80's. The projection is of the order of 10.3 million lines of switching equipment comprising local exchanges, trunk automatic exchanges, telex exchanges and PBX's. The ITI's order book is far too heavy.

Tender specifications for establishing factories have been drawn up by an expert committee, including representatives of the P and T, the electronics department and the ITI. Global tenders have been accordingly floated. An import of two lakh lines of finished equipment for electronic exchanges is also planned.

Nevertheless, there is bound to be some shortfall, as the first new factory will take at least four years to build and reach its full rated capacity. The second factory is to start production two years later so as to able to profit by experience.

It is here that the ITI's R and D has acquired its urgent relevance. According to the chairman, Mr. G. S. S. Rao, who is quite confident that the challenges could be met, 60 per cent of the equipment currently being manufactured is of indigenous design. Even in the remaining 40 per cent substantial adaptations have been made to improve reliability of operation.

One of the substantial achievements of R and D at Bangalore is the Indian version of the cross bar exchange which rectifies many of the limitations of the original system to suit Indian conditions. Since then the government has approved a project for the manufacture of 200,000 lines a year of the indigenous version at Rae Bareli at an estimated cost of Rs. 64.5 crores. The design has been developed by a joint team of the telecommunications research centre and ITI engineers to provide a solution to all the problems encountered in the previous system. The original system could not cope up with the density of calls, which is far less in all other countries where it is in vogue.

The R and D programme has also produced a sizable force of highly skilled manpower working in wide-ranging areas like electro-mechanical and electronic exchanges, computerisation, cable circuits, special devices for defence services, transmission equipment and satellite communication.

Has the ITI taken too much of a load on itself? Why not other state electronic corporations have a share? Mr. Rao has an answer. With the extent of its investment, availability of skills and other facilities, it would be better to make optimum use of its resources than divert funds from the national exchequer. Much can be said on the capability claims of both sides as, for instance, the Gujarat Electronics Corporation has successfully delivered the goods to non P and T users of communications equipment like the Oil and Natural Gas Commission (ONGC) and the railways. In any event, the decision rests at a much higher level than with the ITI.

CSO: 5500/7174

PRODUCTION OF ELECTRONIC TELEPRINTERS PLANNED

New Delhi PATRIOT in English 12 Aug 81 p 5

[Text] **THE public sector Hindustan Teleprinters Limited will take the country to the electronic era by producing electronic teleprinters by the next year at its new unit at Hosur in Tamilnadu.**

According to HTL's expansion programme, which has been approved by the Government, the switch-over of production to electronic teleprinters will be completed by 1985 when it will stop rolling out the present electro-mechanical machines. The Madras unit, which now produces these machines, is being streamlined for exclusive production of electronic typewriters.

Chairman-cum-mananging director of HTL B C Seetharaman told visiting newsmen at Madras that the existing unit would continue to produce spare parts for the machines already in use. He said 23 firms had responded to the tender for technical collaboration. Negotiations will begin by the month-end, after the tenders are opened.

WORLD BANK LOAN

Finances for meeting the payments for the foreign process could be met by a Rs 5 crore World Bank loan. The initial production target of 5,000 teleprinters will be raised to 15,000 by 1985.

The cost of an electronic teleprinter will be about Rs 25,000 as against Rs 15,000 for the electro-mechanical machines. Mr Seetharaman claimed that this would be more or less on par with the international prices. The HTL is going ahead on the presumption that a few thousand machines will have to be imported initially to meet the demands during the intermediary period.

About 35,000 machines partly electronic and partly electro-mechanical, will be produced between now and 1985. The demand was expected to go up to 60000 machines during the seventh Plan. It was explained that though India has been exporting teleprinters, these have no demand now as they have become obsolete. However, HTL expects a promising market abroad for the new machines.

In the fast-changing production technology, it is anticipated that the new electronic teleprinters will also become obsolete by early '90s. But they can survive at least seven years after 1985. Mr Seetharaman said the new technology could be brought for production at that time.

HTL will produce about 15,000 electric type-writers at the existing plant in collaboration with Olivetti of Italy. It is estimated that the price of the new typewriters will be around Rs 6,500 Though HTL had produced its own electric typewriters, it became a failure. It was given up in 1973.

The Italian company would also like India to produce Arabic electric typewriters under a buy-back arrangement under the former's brand name. Quotations have been sent by HTL for this purpose. The HTL has successfully produced electro-mechanical Arabic teleprinters and is exporting them to the Gulf.

HTL has also received a letter of intent from the Government for the manufacture of 25,000 floppy drives for computers. Other items on hand are data modems.

In spite of the significant strides since its inception in 1963, HTL is yet to gear up its research and development wing. Its small, young dedicated cadre faces several handicaps. It needs more staff equipment and above all, recognition. Its funds are limited.

Despite all this, HTL has been able to acquire enough expertise to evaluate any production technology being imported. Its biggest achievement is an automatic dialling equipment for telex which is to be ready in 15 months. It is claimed that this is the first of its kind in the world.

CSO: 5500/7179

OFFICIAL FIBER TECHNOLOGY EXPECTED BY END OF 1982

New Delhi PATRIOT in English 31 Jul 81 p 5

[Text]

MADRAS, July 30 (PTI) INDIA is poised to make a major technological breakthrough in communications with the 'giant step' taken by five institutions to develop optical fibres (glass crystal pipes) that promise to make terrestrial communications cheaper and more efficient than satellite communications.

Keeping up with the latest technology available in the United States, Soviet Union and West Germany, these institutions (the IIT at Madras), Kharagpur and Kanpur, the Central Scientific Instrumentation Organisation (Chandigarh) and instrumentation research and development Debradun have engaged themselves in the task of making "optical fibres" indigenously.

Optical fibres, tested for endurance against floods, shocks, and even nuclear radiation, can revolutionise communications in India in the nineties, providing an economically feasible telegraph, teleprinter, telephone and TV network at much cheaper cost than satellite communications, according to Dr J P Raina project director of communication grade fibre technology at the IIT Madras.

Dr Raina told PTI that the IIT here would be able to bring out a prototype communication tank based on optical fibre technology before the end of 1982 for use in communications in ships, aircraft and even satellites.

The optical fibre, smaller in diameter than a pin head and stronger than copper wire, could carry information on 35,000 analog telephone channels or 2200 TV channels as against the coaxial cable's 100 channels and the conventional cable's 10 channels.

In India, fibre optics would play at major role in the nineties and early 21st century when the pressure on existing telecommunications networks would have reached saturation point, he said.

With every monsoon and flood the telephone network was thrown out of gear. Fibres would be resistant to such damage.

CSO: 5500/7169

BRIEFS

ROHINI BURNS OUT--Bangalore, August 5 (PTI): "Rohini One", the first Indian satellite launched from Indian soil with the country's own launch vehicle SLV-3, re-entered the earth and burnt out on July 24, after being in orbit for over a year, the ISRO announced here today. Rohini was injected into a near-earth orbit from Sriharikota on July 18 last year with the primary mission to evaluate the performance of the fourth stage of SLV-5 launch vehicle and monitor important parameters such as velocity, separation shock, pressures and temperatures. Though originally the life of the Rohini mission was estimated at 100 days, the 35-kg. satellite was in orbit for over a year. It satisfactorily fulfilled all the mission goals and provided useful data till it re-entered the earth, the ISRO said. The Rohini, also carried indigenously fabricated solar panels containing indigenously manufactured solar cells. The satellite was helpful for the ISRO tracking network for tracking experiments and orbit modelling. The satellite was orbiting with an apogee of 910 km. and a perigee of 308 km. It had an orbital period of 97 minutes. [Text] [Bombay THE TIMES OF INDIA in English 6 Aug 81 p 5]

BHASKARA OPERATIONS END--Bangalore, Aug. 11.--The normal operations of Bhaskara, India's first earth observation satellite, have been terminated after fulfilling most of the mission goals in the two years of operation, the Indian Space Research Organization said today, reports UNI. An ISRO Press Note said though the satellite was nominally planned for a design life of one year, the life was extended to nearly two years through careful management of the onboard gas for control operations. It said the normal operation of the satellite was terminated on August 1 since the fuel on board had depleted and control of payload operations were not possible. [Text] [Calcutta THE STATESMAN in English 12 Aug 81 p 9]

PONDICHERRY-MADRAS STD--Pondicherry, Aug. 11. The Union Communications Minister, Mr. C. M. Stephen, has called upon the employees of the Posts and Telegraphs Department to develop a sense of "collective commitment" to serve the nation instead of indulging in the concept of collective bargaining. Switching on the Rs. 85-lakh automatic telephone exchange of about 3,000 lines at a function here today Mr. Stephen said that by the end of 1990 about 75 lakh telephone lines would be operated as against the present 25 lakh connections. Mr. Stephen also inaugurated the point-to-point STD service between Pondicherry and Madras. He dialled to the residence of the Tamil Nadu Chief Minister, Mr. M. G. Ramachandran to convey the message that he was connecting Pondicherry to Madras over STD. [Text] [Madras THE HINDU in English 12 Aug 81 p 9]

CSO: 5500/7178

FRENCH MINISTER DISCUSSES SALE OF SATELLITE

Rio de Janeiro JORNAL DO BRASIL in Portuguese 24 Jul 81 p 15

[Interview with French Minister of Foreign Trade Michel Jobert by Arlette Chabrol of JORNAL DO BRASIL 23 July 1981; place not specified]

[Text] Brazil is soon to acquire a French communications satellite. The subject was discussed yesterday in Rio and Brasilia between French Minister of Foreign Trade Michel Jobert and Brazilian authorities. The contract was not signed, but "in-depth" and "very advanced" discussions allow one to think that its signing could take place within a short time.

This new cooperation, in a certain way unforeseen, appears to prove that Brasilia does not fear negotiating with the socialist leaders now in power in France. The minister of state, Michel Jobert (former foreign minister under President Pompidou) confirmed during an interview he granted JORNAL DO BRASIL yesterday morning the continuance of good Franco-Brazilian relations based on "well-pondered" matters.

Trust in Brazil

[Question] The France of Valery Giscard d'Estaing made efforts to have good relations with Brazil. Does your presence in Rio de Janeiro and Brasilia some weeks after the formation of the government mean that the France of Francois Mitterrand is determined to continue those efforts and possibly intensify them?

[Answer] I must say that my presence has no single or absolute meaning. I came as a result of commitments assumed with the Congress of Professors of France, which I am seeking to meet even though in the meantime I became a minister of government.

That point cleared up, I am here by agreement of the Brazilian Government, which invited me without embarrassment. On the French side, we shall not hesitate in following the efforts toward Brazil: the priorities given to Brazil and the technologies exported here by us are well pondered matters. There is no reason to refrain from making decisions on them.

[Question] Did your first meetings, your first contacts, give you the impression that the Brazilian authorities may be concerned about the political change which has taken place in France?

[Answer] With respect to policy, I would say no. With respect to the economy, there is a desire on the part of Brazilian authorities to insure that whatever the dangers of the challenges posed to Brazil may be, the potential capabilities of the country be given a greater consideration. And France is fully aware of the importance of those capabilities with respect to possible dangers. As a result, it is a matter of initiatives well-thought out by both sides.

[Question] Francois Mitterand and his government made several statements of intention on the establishment of new relationships with countries of the Third World, within the framework of the North-South dialog, can a change in the nature of bilateral relationships be expected between Brazil and France?

[Answer] It is always very hard to trace a fair path between sentimental speeches and realities. However, the French Government did well in having announced that sentiment. Its view of balance is first of all cooperation with the Third World and its development. This is not a matter of a vague element in a speech. It means that in every conversation, in every negotiation, French representatives do not lose that orientation, that objective.

Let us look at an example: We know very well that we are not going to obtain a reform in the international monetary system which takes such exigencies into account tomorrow. That is what happened in the Ottawa Conference. However, everyone can evaluate the orientation of the French Government at that meeting. Beyond the difficulties and obstacles, we shall try to maintain the singleness of ideas and an attitude.

In that which refers more specifically to Brazil, I will say that to us that country is one of the areas of the world where tomorrow powers will be divided. We would be very blind if we did not note that. Let us contribute to the industrial and technical development of Brazil, particularly since a high technical, industrial and scientific activity is always the best trading partner for an industrial country such as mine.

[Question] It is said that Brazil should buy a satellite from France. Could you confirm that report?

[Answer] Should? I will say that there is no obligation unless it is that of the heart and the mind; of the heart because we would be very pleased if Brazil could become adept in that area by means of our advanced technology; of the mind if we consider that such material appears to be exactly suited for what Brazil is seeking.

[Question] Among the questions discussed by President Figueiredo during his visit to France in January, which were outstanding in the negotiations?

[Answer] None of the matters brought up during the visit by President Figueiredo were neglected. I even believe that with respect to certain questions, particularly in the field of energy, we made very good progress; so much so that today the only question still to be resolved is a judicious choice among several projects and the renewal of the financial efforts which accompany them.

[Question] You had expressed the idea that the appointment of communist ministers could be subjected to a probationary period. Now that they are in government, do you believe that their presence may harm France, particularly abroad, in foreign trade?

[Answer] No, I do not have the impression. Malicious tongues even went as far as to say that some countries of the West expressed concern in that respect. But let us be more reasonable with respect to facts: Have the goodness to remember what I once wrote before the first round of the legislative elections. Now, after those elections, the importance of the Socialist Party became so great that the participation by communist ministers in the government became only the banal practice of an internal policy. Thus it is time to understand and evaluate the presence of my communist colleagues in government.

[Question] Is your position in the ministry not particularly critical? Do the positions of principle of the new government of the left always agree with commercial interests and the export needs of France? For the time being France is bent on fulfilling the contracts signed by its predecessors. What about tomorrow? Will the possible loss of customers be balanced by new markets?

[Answer] You are most gracious in your concern over my intellectual and government welfare. Every government, if it begins an action or follows an action, is always interested in describing its position. Observe carefully, I do not say a program, I say an attitude because it is important to distinguish between what is desired and what is intended, despite the difficulties and the inevitable wear and tear which the daily life of nations exerts on enthusiasm and arguments.

I have nothing to retract of everything that has been said up to now and which emanates from a general and ultimately lucid inspiration as to the balance of humanity.

There remains daily life. Like many others, I intend to proceed thus, without too many difficulties, particularly so because the French Government is not the government of an idology but of thought and an action well based on the interests of France. It is true that many contract will be entered into, they will have continuity and even expanded. However, there will be others and it will be better if they could exemplify the hopes of humanity and equality which is what is certainly going to guide the attitude of France.

[Question] You were in Ottawa; is it true, as was declared by a member of the French delegation, that there were some "rough conversations?"

[Answer] The final communique is so serene that you could make me doubt having heard some word said in a tone higher than another in the many conversations. In any case, each one knows how to behave with respect to the great problems which weigh over the world of today. In my opinion, the real question which dominated the Ottawa meeting is this: Do we or do we not want to deal with and resolve the great problems? The final communique obviously answers this question unsatisfactorily.

8909
CSO: 5500/2290

SATELLITES NOW UNDER CONSTRUCTION TO BE LAUNCHED IN 90's

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 5 Aug 81 p 24

[Text] The most ambitious scientific project by a developing country--the planning, construction, launching and maintenance of satellites in space, a technology now only known by the United States, the Soviet Union and France--is being developed only 84 kilometers from Sao Paulo, along Via Dutra in Sao Jose dos Campos. The first Brazilian satellites, to be launched as of 1990 with 95 percent national technology, are being built there.

The project became possible thanks to the work being accomplished by the National Space Research Institute, INPE, together with the National Scientific and Technological Development Council, CNPq, which completed 20 years of existence and commemorated the event Monday with a ceremony at Sao Jose dos Campos and with an exhibition of materials and equipment in the area of astrophysics, meteorology and remote sensing.

The INPE was created in 1961, when a group of pioneers in the Aerospace Technology Center, the CTA, subordinated to the Ministry of Air, proposed to the federal government the creation of a civilian organization linked to the CNPq for the purpose of eliminating the technological lag in the area. There emerged then the former National Space Activities Commission, which on 23 April 1971 became the INPE. At this time, 1,051 employees work there, of whom 69 are doctors, 130 are masters, 268 have bachelors' degrees and 584 are technicians. The main administration is located in an area in the aerospace complex of Sao Jose dos Campos, and to these installations are added other equally modern installations in Sao Paulo, Cachoeira Paulista, Atibaia, Natal, Fortaleza and Cuiaba.

The technological training of the INPE for planning and developing the first Brazilian satellites began in July 1972 when the institute began the daily reception at its station in Cuiaba--the geographical center of South America--of the pictures from the U.S. satellite Landsat, which provided valuable information on use of soil, harvest forecasts, environmental pollution, deforestation, reforestation and mineral reserves, at a cost of $200,000 per year. The U.S. Government, according to information by the institute, should shortly turn over the commercial exploitation of remote sensing satellites to private enterprise, which will raise the prices paid for those services, prices today considered only a "token." That is the reason for the need to launch the Brazilian satellites.

Brazilian scientific capability is already at least 4 years ahead of government expenditures: The Brazilian Space Program has been waiting for money since 1978 but it was only last Monday that the allocation of nearly $850 million during a period of 14 years beginning January 1982, was announced. Of that money, 70 percent, nearly $566 million, will be allocated to the Space Activities Center, the IAE of the Ministry of Air.

The IAE is developing the Satellite Launch Vehicle, VLS, a carrier rocket 16.5 meters long with four stages, the last of the "Sonda" family, whose program has been in progress since 1964 when Barreira do Inferno in Natal was created. Of the money allocated to the IAE, nearly $283 million will be channeled into the construction of a modern satellite launching base in the municipality of Alcantara in Maranhao along the shores of Sao Luis Bay. The government of that state has already declared an area of 520 million square meters to be of public domain "for the purpose of expropriation."

The INPE will have the task of planning, building and developing the satellites with the sum of $284 million. Of that money, only 15 percent will be used to purchase equipment abroad. The director of the institute, however, explained that after the launching of the first four satellites, the country is going to acquire the complete "knowhow" of the construction of those technologically sophisticated devices and it will be passed on to private national industry.

The program foresees the launching of four satellites beginning June 1990, the final launching scheduled for December 1944. The first two, which will be launched with a space of a year in between, will be weather satellites. They will weigh nearly 120 kilos and will reach an orbit of 800 kilometers from the earth. They will collect information for the forecast of crops, frosts, floods and weather data.

The last two satellites will be launched in June 1993 and June 1994. Each of them will weigh nearly 150 kilos and will reach an orbit of 650 kilometers above the earth. Their function will be to perform remote sensing over all of national territory, which will allow the discovery of new mineral and petroleum deposits, even forecasting the potential of each one.

Another INPE project is the construction of a laboratory for rocket fuel research, which is already being built in Cachoeira Paulista in Paraiba Valley. This laboratory will be responsible for the discovery of more powerful liquid propellents to fuel the gigantic rockets which place the satellites weighing more than a ton at a height of more than 36,000 meters in a geostationary orbit [as published; presumably means 360,000 meters]. At the same time, the INPE is performing research with solar cells for the purpose of developing the energy that will be used in the operation and maintenance of the equipment carried by the satellite.

8908
CSO: 5500/2290

BRIEFS

GULF COMMUNICATIONS MEETING--Abu Dhabi, 26 Aug (QNA)--The representatives of three Gulf countries--Qatar, Bahrain and the UAE--have ended their 2-day meeting to discuss the means of implementing a project to link the three countries and Saudi Arabia with a coaxial cable. The project will cost 50 million dirhams, or about $14 million, and will strengthen direct communications between these countries. During the meeting, an agreement was reached to provide support lines once the direct lines linking the region have been established. This will ensure efficient communications. Communications requirements for the cable departments for the next 10 years were also discussed during the meeting. The UAE proposed a working paper on the special technical bases required to operate the coaxial cable between the countries. An official source at the UAE communications authority said it has been decided to discuss the technical details of using the coaxial cable in telephone calls between the countries. It will be discussed during a meeting that will be held later and which will be attended by information representatives from the countries of the region. They will study the needs and requirements for television transmissions in the concerned countries. [Text] [GF261435 Doha QNA in Arabic 1108 GMT 26 Aug 81]

CSO: 5500/2295

BRIEFS

TELEVISION REPEATER STATION--The repair and maintenance unit of the voice and vision of the Islamic Republic of Iran, Shiraz, has reported that the Bavanat television repeater is operational and that Bavanat citizens can now watch television programs of the voice and vision of the Islamic Republic. The television repeater will be used for a 6-month trial period. [Text] [GF110636 Shiraz Domestic Service in Persian 1430 GMT 10 Aug 81]

FARS TELEVISION COVERAGE--Effective 13 August, QOTBABAD, in the Jahrom area, and QIR VA Karizn District, in the Firuzabad area, have come under television coverage by the vision of the Islamic Republic of Iran. [Text] [GF132042 Shiraz Domestic Service in Persian 1430 GMT 13 Aug 81]

CUTBACK OF TRANSMITTERS TIME--[Communique issued by Voice and Vision Shiraz Center on 17 August 1981] In his exalted name, the esteemed residents of Fars, Bushehr and Kohkiluyeh va Boyer Ahmad are hereby informed that the transmitters of this center will be off their air after the midnight news and will resume broadcasting at 0600 in order to economize on spare parts and power and to fight the economic embargo. The officials in charge of mosques are requested to broadcast the morning Adhan from the mosques' loudspeakers for the convenience of our sisters and brothers. With thanks. [Signed] The Voice and Vision of the Islamic Republic of Iran, Shiraz Center. [Text] [GF171615 Shiraz Domestic Service in Persian 1430 GMT 17 Aug 81]

CSO: 5500/5516

BRIEFS

SATELLITE STATION--[TANJUG "Pool" item] Accra, 26 Aug (GNA)--Ghanaian television viewers now have the opportunity to view live various events from overseas on their sets. This is possible thanks to the successful completion of a series of tests on Ghana's satellite station at Kuntunso near Accra. Built with a 5.72-million dollar loan from the Export Development Corporation of Canada, the station will provide Ghana with large capacity, high quality and reliable external telecommunication system on a 24-loan [as received] basis. It will access the Atlantic Ocean satellite in the internal system and also provide pre-assigned circuits for telephone, telex and telegraph to France, West Germany, Britain and the United States. [Text] [LD270504 Belgrade TANJUG in English 0900 GMT 26 Aug 81]

CSO: 5500/2295

PANAFTEL LINK WITH SENEGAL IS OPENED

Monrovia THE SUNDAY PEOPLE in English 2 Aug 81 pp 1, 8

[Text] THE Pan African Telecommunication link between Liberia and Sierra Leone was Friday formally opened by the Liberian Head of State, C-I-C Samuel Kanyon Doe and Dr. Siaka P. Stevens, President of Sierra Leone.

Speaking at his Executive Mansion office in Monrovia, Head of State Doe said the occasion was the continued determination of Africans to bring into reality, greater unity, solidarity, progress and development through communication.

He said it further demonstrated the Liberian Government's desire to span new areas of cooperation and to strengthen the bonds of understanding between African nations.

"In this endeavour," Head of State Doe said, "we are striving to decolonize the African Telecommunication System by making it possible for us to communicate with each other without going through Europe."

The Liberian Head of State described the event as "a major achievement toward strengthening the friendship between Sierra Leone and Liberia and for promoting the objectives of the Mano River Union."

C-I-C Doe said Liberia was continued to make progress in its telecommunications network and added that the efforts were aimed at achieving the goals of the United Nations Resolution which declared 1978 — '87 Transport and Communication decade in Africa.

He said Government was endeavouring to extend communications facilities incldng telephone, cable and telex to the rural areas, in addition to developing an effective rural broadcasting system.

At the formal commissioning of the telecommunication link, Head of State Doe and Dr. Siaka Stevens exchanged warm greetings and briefly discussed some bilateral issues of interest to both countries.

Earlier, Posts and Telecommunications Minister, Major (Dr.) George Boley also exchanged greetings with Sierra Leonean Minister of Posts and Transport, Mr. Kebbie.

The occasion was witnessed by the officials of Government including PRC Secretary - General, Col. Abraham B. Kollie, Minister of State for Presidential Affairs, Major (Dr.) Harry Nayou and Information Minister, Lt. Col. Gray D. Allison.

CSO: 5500/5068

INTEGRATED SERVICE DIGITAL NETWORK: PROBLEMS, PROSPECTS

Rome NOTE, RECENSIONI, NOTIZIE in Italian Jan-Mar 81 pp 7-15

[Article by Professor of Engineering D. Gagliardi, director of the Higher Institute of PT (Posts and Telecommunications), Rome: "The New Telecommunication Services and the Integrated Digital Network: Problem Areas and Outlooks"--lecture delivered on 5 February 1981 at the ceremony inaugurating the 1980-1981 courses of the Higher School of Telecommunications Specialization]

[Text] Summary

The present note was the subject of the inaugural lecture for the Telecommunications Specialization Course for engineers given at the Higher Institute of PT.

The problems that telematics poses to the managers of telecommunications services are examined, and the actions undertaken by the PT Administrations of the ECPT [European Conference on Posts and Telecommunications Administrations] to cope with them are illustrated.

Next are considered the considerations motivating the PT Administrations to set themselves the objective of building an Integrated Service Digital Network (ISDN) capable of performing both the traditional services and the new telematics services, with the use of single, multiservice terminals.

The foreseeable scenario of evolution of the networks toward the ISDN is outlined, with the first phase in this evolution stated as the building of specialized networks capable of upgrading the existing ones and hence of permitting, in an economical way and with different performance characteristics, the operation of new services.

Hon Minister, Hon Subsecretary, Officials, Ladies and Gentlemen,

To all the personalities here gathered who have wished, by their presence, to honor the inauguration of the courses of this Higher School of Telecommunications Specialiation for the 1980-81 academic year, I offer the sincere thanks and warm appreciation of myself as well as of all the staff of the Higher Institute of PT and of the Ugo Bordoni Foundation, which, as is known, collaborates with the Institute itself in research activities.

In their very well-received welcoming addresses, the Hon Minister and the General Director discusses, in very effective summary, the main points of the history of this Higher School, which year after year, with work perhaps a bit obscure but certainly worthy, has contributed to the training of so many telecommunications specialists, who have then gone on to put their preparation and competence to use in the most various public and private organizations.

I will certainly not overlook the fact that a profound modification of the structure of this school now appears necessary in order to give it a new impulse and greater conformity to the present necessities. I am confident that such modifications will be achieved quite quickly.

Nevertheless I am convinced that even in the present conditions, the School, thanks to the dedication and zeal of those--the Board of Directors, the instructors and the entire staff-- who work within this structure, will still be capable of meeting the expectations and, this year too, giving the young people who with trust and enthusiasm are rolling up their sleeves to spend 6 months with us everything that is necessary for their entry into the world of work.

It is with this thought that, again thanking everyone present, I declare open this School's 1980-91 academic year.

The Hon Minister, in his address, presented to us a very effective and complete panorama of the fundamental points relative to the lines of development of telecommunications in the coming years, and also delineated the essential aspects of Italian telecommunications policy, touching on all the subjects of greatest importance and current interest.

We all listened with keen interest and the closest attention to what the Minister communicated to us, in view of the great current interest and importance of the topics dealt with.

For my inaugural address, which will touch upon the most important problem areas of the telecommunications services and networks, there could not have been a better introduction: the panorama presented by the Hon Minister constitutes for my talk a clear, effective and solid starting-point, one that will facilitate--and not just a little--the task that I am about to carry out.

There is now under way the process of transformation of our society, as well as all industrially advanced societies, for that matter, from an era dominated by movement of materials and persons to an era dominated instead by the production and movement of information. Communication is therefore tending to take on a predominant role in all sectors of activity as well as in the private lives of individual citizens, decisively conditioning their efficiency and security.

With an often used but meaningful expression, we can say that we have now entered into the "era of the information society."

Great volumes of information, of the most various kinds (voice, data-images) and with the most diverse destinations (from person to person, from person to machine and from machine to machine), have to--and in future will have to even more--be exchanged rapidly, economically and securely, and will obviously have to have special characteristics of quality, depending on the case.

The development of data-processing has indubitably fueled and helped to increase the necessities of communication, but on the other hand the development of data-processin has itself furnished--along with telecommunications--the very tools needed for meeting the necessities of communication.

In particular, in order to avoid overburdening and complications of hardware and software (with consequent reduction of reliability and flexibility), there has now been a transition--or at least there is a trend in that direction--from families of computers based substantially on a self-sufficiency of processing capacity and memory (leading to the end result of computers of very large dimensions and capacities) to computer families of, as it is usually put, "horizontal"-development type: in this case, the processing and memory capacity is distributed and allocated principally where the information originates or is used. Computers of lower power, sited in various places, are thus called on to interact with one another and to interact also with a large number of more or less "intelligent" terminals, which in turn are located in still other places. The interaction between computers and between these terminals obviously occurs through the means of telecommunication, which thus become an indispensable support of the information systems.

Thus remote data-processing, or telematics, is born. But data-processing is not limited, as described up to this point, to becoming for the telecommunications networks a special customer that dictates conditions of service of performance characteristics: it enters, with its technologies and its functions, as a protagonist in the world of telecommuncations itself (terminals and networks), on account of which it is perhaps not too bold to conclude that data-processing and telecommunications are now two sides of the same reality.

In making use of the means of telecommunication, the special customer, data-processing, could not escape the general rule already stated--the pursuit of conditions of economy, quality, security and secrecy adequate for the types and volumes of information to be transmitted. The public telecommunications networks (telephone and telex) existing at the time when these needs began to be manifested very often did not make it possible to satisfy any of the conditions first enunciated.

Therefore, in order to meet the needs of data-processing in some way with adherence to the conditions first enunciated, the private networks were born--"closed" in that they were not connectable to the public network, and "limited" in that they were for particular groups of users.

Such networks, which today often extend beyond the national territory and take on international and even intercontinental dimensions, can be built at a speed unthinkable for the big operators of public services, both because they use existing infrastructures, because they are not designed with long-term objectives, and finally, because very extensively detailed specific experiences can be made use of that derive from the sectorial nature of such organisms, which are not forced to distribute the economic, design and management capacities over a wide range of diverse activities.

These networks normally use circuits leased from the operators of the public telecommunications services, while the terminals and switching equipment are installed and operated by the organization that runs the network.

At times, the national norms provide that switching equipment must be furnished by the operator of the public services. In any case, though, it is certainly an unsat-

isfactory situation for the operator of public telecommunication services, especially if, as tends to happen, it is protracted in time and extended to a large number of networks: the operator tends to be transformed into a supplier of means of telecommunication, without contacts with the operation, without the possibility of achieving a network optimization that would balance out the operations general needs, and especially, without obtaining the proper economic compensation as between a low-traffic operation and a valued high-traffic-volume operation.

The situation would be made even more difficult if a foreseeable network using satellites for specialized services were to take on the connotations of a private network --that is, if it were built outside the sphere of the normal operators of public telecommunication services. A network of that kind would be designed to offer--for a particular category of business usage--a whole series of possibilities of communication in a particularly integrated form, and more specifically, both possibilities already offered by the present earth-bound networks and possibilities not yet satisfiable by means of those networks; one definitive aspect of such a network has to do with the fact that the information would be transferred "from one roof to another" of the various users, thereby completely bypassing the earth-bound public networks' system, even as regards the simple leasing of the means of transmission.

This scenario as delineated (closed private networks, earth-bound and via satellite) brings out a situation that goes by the name of "attack on the telecommunications monopoly," or--a less dramatic expression--privatization of telecommunications." We might wonder how and why a situation of this kind has been developing. The causes are obviously many and of various kinds; if we want to give an answer to the question here, certainly a partial answer, we can say that "the operators of the public telecommunications services have not normally been in a position to satisfy with due promptness the new requirements posed by data-processing, fundamentally because of the fact that because of their mission and their mandate, they did not feel they could set themselves the objective of satisfying an operation that is limited and concentrated in several parts of the territory, while inversely, at least as a matter of principle, they would have to make themselves capable of satisfying a potential usage that in any case would be scattered over the national territory and would thus have to cope with the considerable magnitude of the financial commitments involved.

But for some years now, the operators of the public telecommunication services have been carrying out a more open and dynamic strategy, aimed at rationalizing the situation and gradually promoting a recovery of the operations that today are comprised in the private networks.

The fundamental point of this strategy starts from the consideration that since the attack on the monopoly has a character and extent that go beyond the competencies of the individual countries, the measures to be adopted fall within the broad outlines agreed upon among the PT administrations of the various countries (at least among those belonging to the same geographical area); and differing attitudes on the part of the various countries with regard to this phenomenon would disorient operations, producing unforeseen attitudes and possible unnatural traffic flows. A "telecommunications policy" at least on the level of Europe is called for, and coherent technical actions should be carried out that are sufficiently well agreed upon in their nature and in their times of implementation.

The organism through which it is being attempted to carry out this European policy is the ECPT, to which the PT administrations of 26 European countries belong.

The strategy decided on provides, as already stated, for a defense of the monopoly not on positions of barricading or immobilism but, on the contrary, on the basis of positive and concrete actions, carried out dynamically and aimed at timely identification of the operation's needs and implementation of the best means for meeting them.

The public networks have inherently the great advantage, for operational purposes, of making possible a larger possibility of connection (national and international), provided that the terminals to be connected adhere to identical codes; and it is therefore a matter of equipping them to provide the required performance characteristics--of quality, availability, speed and secrecy--and to that extent there will no longer be any interest in using the private networks, so long as the tariffs are set very carefully in order to make the public service preferable from the economic point of view also.

In detail, we can say that the strategy can be considered divided into the following actions:

(a) developing and improving the new services and facilities already initiated, and accelerating the startup of those new services for which potential utilization can reasonably be foreseen. In other words, it is a matter of getting ahead of demand and channeling it, instead of following it.

It should also be emphasized that the services and the facilities are associated here since for the purposes of these considerations, substantial differences and demarcations are not taken note of, even though it is obviously possible to give different definitions for the "services" and the "facilities."

(b) making the best possible use of the existing networks in the first phase, so as to obtain from them the performance characteristics necessary for the new services that it is thought to adopt. In cases of manifest technical impossibility or economic unsuitability, it will be necessary to provide in a timely manner for the building of appropriate specialized public networks. Such networks, while always making use of a more or less large part of the infrastructures of the existing networks, provide for substantial diversifications in some parts of plant, and in particular, they take on the character, in the user's view, of substantially different and separate networks.

(c) intensifying and accelerating the process of digitalization of the telephone network, gradually achieving integration between the transmission techniques and the switching techniques, so that a structure (IDN [Integrated Digital Network]) will be available that is immediately usable in some of its parts for the specialized networks also but will be intended in the long run to serve as a common support for many services and facilities, both present and future, and to be transformed subsequently into the Integrated Service Digital Network (ISDN).

The "actions" listed here lead immediately to several reflections:

(a) The first and most important one is that the various actions indicated should not be considered as events to be studied and achieved independently of one another. On the contrary, a single and coordinated whole is involved: each action has to be integrated with the preceding one and take the following one into account. Furthermore, the various actions are not necessarily subsequent to one another: in a way, they re-

present elements of a continuous evolution, one that is already in progress, for that matter, and that will begin to settle down probably during the 1990's.

(b) The second reflection concerns harmonization of the norms. The vast range of services that is taking shape and the multiplicity of systems that can be foreseen for bringing them into existence could lead, among the various countries of Europe, to differences that might be substantial in their modes of implementation, in the operational procedures and in the performance characteristics that will be furnished to the users, as well as substantial technical differences among the various systems. These diversifications could in the future make difficult, or at any rate expensive, the extension of the same services to an international basis, decisively frustrating the policy objectives set.

A "harmonization" of the national specifications for both of the aforesaid sectors (that is, services and systems), at least on a European basis, seems, for this reason, particularly useful.

The opening--absolutely necessary at times--of services of an experimental character or, in any case, of limited extent, with standards not yet harmonized, will always have to take into account the possibility of an eventual adaptation of the standard to the subsequent harmonized norms.

In this regard, the European norms work on the ISDN merits particular mention. The ECPT, aware of the importance of having available, within a short time, a "harmonized" norm on this subject, has assigned the highest priority to the studies related to it, with the objective--an ambitious, difficult, but also exalting one--of having several basic norms ready as early as the first months of this year, and almost all of the necessary norms by 1984.

(c) The third reflection has to do with research.

The technological developments and the consequent necessities of making use, in brief time intervals, of new generations of network systems and structures poses urgently, to the various operators of telecommunication services, the problem of applied research and development, a problem that cannot be left entirely to outside institutions and firms, for economic reasons but also because of the consequent impossibility for the operators themselves not only of making appropriate choices but also simply of mastering the subject that is their very reason for existence. Hence the necessity of investing in research activity in an adequate and increasing manner, and seeking, where possible, opportune links with other administrations.

The "COST" [expansion unknown] research projects, which concern research coordinated among several countries of the "enlarged" Community area, are a good example of what can be done in the sector.

(d) The fourth reflection concerns the problem of the terminals. Until some time ago, the function of a terminal equipment installation was clear: the installation was designed exclusively for transforming the information in a manner adequate to the transmission means.

There was no doubt that such terminals remained within the domain of the telecommunication service operators, and it was equally indubitable that the construction of them was the task of the telecommunications-apparatus factories.

With the new services and with the advent of remote data-processing, we are witnessing more frequently all the time today a substantial change of the situation: the terminals incorporate with the telecommunication functions already cited also information-processing functions, to a more or less broad extent, and often within a total unit that is not easily divisible, not only at the level of general conception but also at the circuit level itself.

For the telecommunications industry, the consequence of this has been a new competitor, and for the builders of system apparatuses, the necessity to take account of the requirements, sometimes stringent ones, of the telecommunication-services operators, who--rightly--have to see to it that whatever is planned for the functional procedures of the telecommunication networks is available.

In addition to the specific problems posed by each individual service with regard to terminal regulation, problems that can in a way be summed up as the search for an optimal condition for distribution of intelligence between terminals and network, the new situation under examination here poses for the terminals problem areas of a general nature, concerning:

--the properties of the apparatuses;
--the limits of the norms;
--the limits for maintenance;
--the conditions for approval testing;
--the possibility or advisability of the telecommunications operators' devoting themselves also to /information-processing activity/, whenever the service that it is intended to offer to users, especially to the general run of nonspecialized users, comprises and provides for, as a fundamental support activity, a certain amount of processing of the information itself.

The attitudes of the various countries toward these problem areas is are still quite divergent, in view of the different norms and procedures in force also. Nevertheless, one cannot help but note that there are strong trends toward "privatization," albeit cautious and controlled by this sector.

Having thus examined the general considerations about the strategic lines for a coordinated policy on the evolution of telecommunications, it may now be advisable for us to go on to several more specific matters relating specifically to the Italian situation, always with reference to the fundamental "actions" identified earlier.

Specialized Networks and Services

First of all, it should be stressed that considerable development of the "data" services is to be expected, with increasingly intensive and sophisticated utilization of telematics; as the European-level forecast studies (carried out by the Eurodata Foundation) clearly indicate, the "data" terminals in Europe will have to go from about 700,000 at the end of 1979 to about 850,000 in 1983 and over 1.5 million in 1987, with about an 8-fold traffic increase between 1979 and 1987. On the other hand, the tendency toward increasing use of higher-speed terminals is clearly confirmed: whereas in 1979 the most widely used terminals are those of 300 bit/sec (37 percent) and 1,200 bit/sec (32 percent), in 1987 the most widely used terminals will be those of 2,400 bit/sec (30 percent) and 9,600 bit/sec (23 percent).

The Italian situation is well in line with the European forecasts stated above.

In view of these development forecasts and the necessitv of providing, with the public network, adequate performance characteristics capable of satisfying, economically, the requirements of the operation, however it may be distributed throughout the territory, it has seemed indispensable, in practically all countries, to provide for the building of specialized networks for data, to be used not only for the "data" ("telematics") traffic referred to above but also for the other possible new services that may eventually prove to be especially favored by networks of the kind.

In line with these trends, a specialized public network has been planned in Italy too, for a data service of advanced type, using both circuit-switching and burst-switching and coherent with the introduction of the digital techniques, as well as with gradual introduction of the integrated network.

This network is therefore to be understood as a "bridge" solution, of a dynamic character, with a clear evolution toward the ISDN of tomorrow, of which it will constitute an integral part for a very long time.

From the first phases of its building, the organization of the network and the fundamental technical choices have been in harmony with such principles.

The network architecture is articulated on two hierarchical levels:

(a) a higher level (primary network), articulated on central exchanges specialized for data, designed to perform the national and international transit functions and to and to handle also the terminal traffic of the users in its operating area, directly connected to these central exchanges, with dedicated lines.

(b) a lower level (secondary network), articulated on central exchanges designed both for telephone traffic and for data traffic, designed to carry out the functions of usage collection, concentration of the traffic related to it, handling of the internal traffic of the operating area, and routing of the transit traffic.

In the practical building of these structures, precedence will be given to the burst-switching part.

For the initial service phase of the new network, which should go into service toward the end of 1982, it is expected that about 20 percent of data usage should be through these new structures (that is, about 20,000 users, including 15,000 using circuit-switching and 5,000 using burst-switching. For 1990, it is predicted that about 40 percent of the usage (100,000 users) will be through the structures described here, with a significant percentage decrease in use of the closed private networks.

Along with the data services mentioned, many other services are foreseen for the more or less near future. Some of these are still telematics applications, but because of their particular characteristics and the vast range of potential usage involved, they might well take on the character of public services in themselves, or at least "facilities" that involve and are necessary for other services. The new services and facilities that can be identified today cover a wide range of applications in the areas of data-bank information requests (interactive and broadcast videotex), transmission of texts, images and graphics (teletex, facsimile, video-lento, remote copying), transmission of monitoring signals (telesignalling, telemonitoring, remote alarms, telemedicine), teleconferences, videoconferences, videotelephones, etc.

A description of these services, even if a summary one, would certainly be beyond the scope of this talk, in view of the time reasonably available to us. I will therefore limit myself to stressing the fact that all the new services referred to are being subjected to close evaluation by the European PT administrations. Many of them already have in progress, or will shortly begin, experimentation for those services that seem most easily achievable with the present network structures and that also give promise of ample usage development in the short term. The following services in particular fall into this framework: videotex, teletex, facsimile, video-lento and videoconference.

With regard to the Italian programs, it can be declared that 1981 should see the beginning of an experimental phase for the services listed above, in accordance with programs that are now sufficiently well-defined.

I would like to devote just a few words to the teletex and facsimile experiments, which will be conducted within a "unified" framework, considering the two services as complementary aspects of the more general problem of text transmission, which constitutes an important and decisive part of the "office-automation" process and of the future "electronic mail."

The special services deserve a brief separate mention. These are understood today as a "block of traditional and new services" to be offered to particular users, within a "multiservice" view of communications.

Let us recall that multiservice communications are those in which the user can have a choice among speech, written messages and screen images, with the more or less complete possibility of alternations in the course of the same connection.

The problem that can be posed today is whether a specialized national public network should be provided for the special services, a network that would have to be developed through satellites, with terminal stations at the points of usage, in view of the present impossibility of the local and long-distance earth-bound network's furnishing, under the economic conditions that are possible, the entire block of services that it would be thought to include among the "special services."

For a reply to such a question, it is necessary for the time being to refer to a "first generation" that falls within the 1980's.

For this first generation, most of the traffic to be expected should have an international character, inasmuch as it will involve mainly internal traffic of large organizations (industrial, banking or political) of a multinational character--the only ones for which traffic volumes can be anticipated that are so intense and so differentiated as to justify the use of such a communication system.

A specialized national public network via satellite, for special services, would therefore not be either advisable or necessary in the 1980's, even if eventual videoconference-connection demand of a greater magnitude than can be reasonably envisioned today were to change the premises somewhat. It will naturally be necessary to keep track of the various actions of a European character that are under study today and to be ready to participate in them, so as to avoid the building of systems of a private type that would be developed outside the sphere of public management.

For the second generation of "special services," in the 1990's--not yet clearly identifiable today--it should be stressed that in that period, development of the earth-bound integrated-service networks will have reached such a point as to permit meeting the usage demand terrestrially also. This statement is absolutely not intended to suggest that satellites for special services will be useless at that time; if anything, it suggests that in the 1990's, satellites--including national ones--for special services will not be destined to form a self-contained specialized network but rather will constitute, by virtue of their exceptional flexibility and their "wide-band" capacity, an important, significant and unrivalled part of the ISDN integrated network, within a harmonized and appropriately optimized total system.

Digitalization and Integrated-Service Network (ISDN)

There has been a great deal of discussion within the competent international bodies (the ICCTT [International Consultative Committee on Telephony and Telegraphy] and ECPT) about the advisability of achieving an ISDN, with consideration of the advantages and disadvantages of such a structure. Table 1 presents several advantages and Table 2 presents several disadvantages.

Table 1 - Principal Advantages of the ISDN

1 - Economy in network costs
2 - Economy in utilization of equipment
3 - Flexibility in planning
4 - Lower risks from uncertainty of the demand for the new services
5 - Uniform network-access procedures and relative simplification for the user
6 - Considerable improvement of quality

Table 2 - Principal Disadvantages of the ISDN

1 - Greater sophistication of the equipment
2 - Difficulty of achieving optimal planning for all the services
3 - Serious consequences in the event of breakdowns of large magnitude
4 - Technical and legal problems deriving from the use of a single network structure for many services

The conclusion arrived at in both the ICCTT and the ECPT is that in the present state of the evaluations, evolution toward the ISDN seems to represent the most logical and advisable way of replying adequately, rationally and economically to the growing demand for communications of multiservice type.

The studies undertaken in this regard on a European and worldwide basis and the actions initiated or to be initiated are based on four very clear "guidelines"--specifically:

A - For a very long period, the ISDN will have to be able to coexist and interconnect it the various existing specialized public networks.

B - At the time of adoption of the ISDN, it must not excessively penalize, from the economic point of view, the most widespread services.

C - The introduction of new services and performance capabilities will be a continually evolving process, and the network will therefore have to have an "open" character.

D - The local network is the key to the integrated network and requires the biggest investments; consequently, integration of services at the local-network level is of special importance.

In accordance with these guidelines, there is the consideration that digitalization of the transmission lines and of the central switching offices for telephone service remains the obligatory starting-point for achieving integration of the varius services, while we may not overlook the fact that despite the certain development, considerable and at times "explosive," that the other services may undergo in future, the telephone services (especially in the countries that are far from saturation conditions) will still continue to be the fundamental and impelling part of the entire telecommunications complex.

The problem of acceleration of digitalization of the telephone network has therefore arisen in all countries--not only with a view to the future ISDN but also on account of the objective advantages henceforth offered by the digital transmission and switching structures.

These advantages are related to:

--a fundamental economy, as compared with the analog approaches, with regard to switching and transmis ion (over short and medium distances), with prospects of sharper cost decreases over time because of the component-cost effect;

--better basic quality, because of the independence of the transmission process from accumulation of distortions with distance, and because of the greater "equivalent" stability that it is possible to achieve;

--the possibility of using the digit frequencies made available to the network (particularly the digit frequency of 64 Kbit/sec for the telephone channel) for a whole series of services different from telephony; this is an especially useful and economical capability for those types of information that are already digital at the source and have a natural band-reduction in the digital type of transmission.

The digitalization of a network (in the two functions of transmission and switching) involves establishment of an "Integrated Digital Network" (IDN).

The IDN can be defined as "a network that is digitalized as far as the local central offices and in which the analog/digital changeovers are carried out only at the two extremities of each connection--that is, in the local central offices."

Elimination of the intermediate analog/digital changeovers brings further economies and quality improvement that are added to the "basic" ones already pointed out.

As regards the overall economy of investment for an IDN as compared with an analog network with switching by electromechanical techniques, a reduction of about 50 percent is normally postulated by the specialists of the various countries, with reference to the equipment only (that is, without taking into account the economies resulting from reduction of volume, lower consumption, the considerable simplifications in installation of the central switching offices, or of the costs of the transmission equipment and the other infrastructures).

In any case, it must be pointed out that in the first startup phase of the digitalization process, the aforesaid economic advantages will be far from evident, because of the startup investments and the numerous, serious and complex problems raised by coexistence with the existing analog network.

It must be said further that the IDN will lead also to variations in the conception of the higher network structure, because of the differing dimension and functional structure of the digital automatic switches and the difference in the geographical siting of them. Thus, with reference to the National Telephone Regulation Plan, the technical-economic advantage of elimination of transit switching in the sector centers, with the establishment of direct beams between the urban-network centers and the district centers, seems clear. Furthermore, the number of district centers will probably decrease. An increase in the percentage of transit traffic through the highest hierarchical levels of the network is also probable.

The pace of digitalization differs in the various countries, depending on the state of development and the age of the existing analog network; and the industrial purchasing policy that it is intended to follow differs also.

In Europe, the pace is highly variable: in some countries, no further contracts with industry for analog transmission and switching equipment will be made as from 1981-1982, and in others, the process of digitalization has scarcely been started.

The digitalization process in Italy is being pursued very decisively, though with adherence to a necessary series of restrictive conditions as presented in Table 3. We can say that the degree of digitalization reached today and the existing programs put Italy among the European countries with the most intensive levels of digitalization.

Table 3 - Guiding Concepts for Digitalization

1 - Utilization of the potential capacities of the existing analog systems, depending on technical-economic evaluation.

2 - Utilization of the existing analog systems to completion of their useful life, depending on technical-economic evaluation.

3 - Consideration of the service-growth programs and of any eventual delays that might be caused by waiting for development of new techniques.

4 - Adherence to the conditions of service quality for the user and of the necessary degree of reliability.

5 - Attention to the problem areas of operation management and maintenance.

6 - Attention to the industrial problem areas.

Let us give here a few figures relative to the Italian situation. In the district framework, it is expected that the degree of penetration of digital circuits--about 40 percent today--will reach 70 percent by 1985, with the use both of physical carriers and of radio bridges. The optical carriers will be developed in parallel, starting with the urban setting.

As regards the compartimento network, starting next year there will be a gradually increasing introduction of systems of 140 Mbit/sec in cable and of 70 Mbit/sec by radio bridge.

In the intercompartimento network, and also starting next year, systems of 140 Mbit/sec will be introduced both in 2.6/9.5-mm coaxial cables laid long ago and via 11-GHz radio bridges (if there are no impediments of a technical nature); and from 1985, introduction of large-capacity digital systems (565 Mbit/sec) in highway-laid 2.6/9.5 coaxial pairs will be started.

As regards switching, a time-period law for supplying the digital-technique central offices has been provided for; this law provides for the gradual changing-over of production, within the current decade, from electromechanical to electronic. Starting from the beginning of the 1990's, all equipment supplied to the central offices will therefore be of digital type, and by the end of the 1990's the extent of the digital central offices should practically equal that of the electromechanical central offices in service.

The process of integration between the transmission and switching techniques will begin with the transit central offices, starting already at the end of this year or the beginning of next year; by the end of the 1980's, the integration process will be considerable for the transit central offices, and will not be negligible for the local central offices either.

To return, regarding certain aspects, to the studies on the ISDN of the future, it should be said that, in accordance with the fundamental guidelines cited above, the architecture planned for the ISDN provides for two categories of functions: one (designated A), of basic type and 64 Kbit/sec, is provided for in all the terminals and all the central offices; another (designated B) is carried out by special add-on equipment that can be sited at a limited number of points. The important thing is that the local network permit the possibility of giving access to such special equipment, through the receiving of a special selection signal; once access is obtained, the remaining signaling information between terminal and special equipment will pass into the 64-Kbit/sec channel.

Within this framework and in conformity with the necessity of interconnection with the other specialized networks, steps are then taken toward the ISDN through a multiservice network, which in the last analysis consists in interconnecting the various networks with an initial integration at the local level only, leaving more intensive integrations for the subsequent phases. In other terms, it can also be said that the multiservice network is composed of a complex of networks that provide for different services but that utilize a single user line and a common signaling system; the complex of networks thus interconnected will therefore appear to the user as a single network.

Finally, a word about the process of evolution toward the ISDN. This process can be viewed from various angles:

--as regards the choice of the services to be integrated at each phase of the evolutional process;

--as regards the methodology of territorial extension;

--as regards the implementation times.

It is to be expected that in all the aspects listed, the process of evolution will take different courses in the various countries, because of the differing local situations, such as:

--the age of the existing equipment;

--the degree of development of the existing specialized networks;

--the forecasts of potential usage expansion for the new services.

--the conditions of management of the various services.

A certain rapprochement of the various positions is to be hoped for, though, so as not to delay too much the time--foreseen today as around the year 2000--when there will be an integrated digital network of international type, developed at least over Europe, and capable of transporting the same types of information and permitting conversations between multiservice terminals no matter what countries they are in.

Having thus arrived at the end of my talk, I must thank you and apologize: thank you for the courteous attention you have given me, and apologize for having taken so much of your time.

My intention was to show that in this phase of great transformation of the structures of telecommunications and of demands for new services, there is indeed a coordinated design that guides and interconnects the various actions, but a design that is flexible, always ready to adapt, with the fewest misfires possible, to the requirements of society and to the proposals of technology, both of which are continually variable.

If I have succeeded in this purpose, I shall consider myself satisfied.

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